LESSON MAKER PRO

Graph the Changes

Plot key points, then show how the graph behaves between them.

HIGH SCHOOL · F.IF.C.7.f

F.IF.C.7.f "Graph all functions including piecewise-defined functions, step functions and absolute value functions"

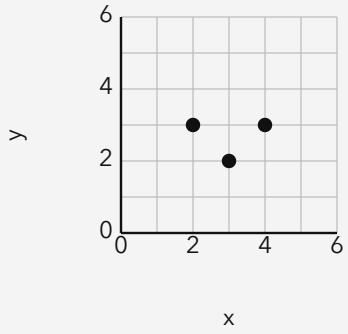
NAME _____ DATE _____

PLOT AND CONNECT

For an absolute value graph, plot the vertex and points on both sides, then connect them with straight segments. For a step or piecewise graph, check each boundary: use an open circle if the endpoint is excluded and a filled circle if it is included.

WORKED EXAMPLE

Complete the graph of $y = |x - 3| + 2$ for $1 \le x \le 5$ using the plotted points.



1. At $x = 1$, $y = |1 - 3| + 2 = 4$.
2. At $x = 5$, $y = |5 - 3| + 2 = 4$.
3. Plot (1, 4) and (5, 4). Connect all five points to make a V.

Answer: The graph has straight segments from (1, 4) through (3, 2) to (5, 4), including both endpoints.

PRACTICE 4 problems

1 For $y = |x + 1| - 2$, give the vertex and one point where $x = 0$.

ANSWER _____

2 For $y = -|x - 2| + 4$, give the vertex and one point where $x = 4$.

ANSWER _____

3 A step graph has $y = 1$ for $-2 \le x < 1$ and $y = 3$ for $1 \le x \le 4$. Give its open and filled points at $x = 1$.

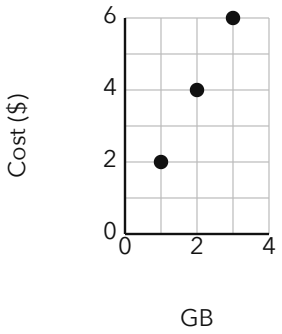
ANSWER _____

4 A piecewise graph has $y = x + 2$ for $x < 0$ and $y = -x + 1$ for $x \ge 0$. Give its open and filled points at $x = 0$.

ANSWER _____

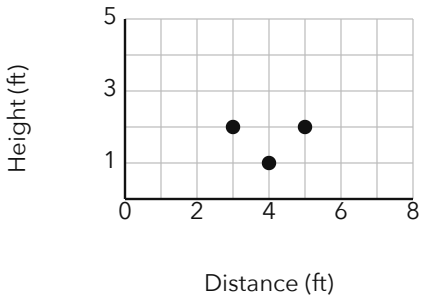
APPLY IT Show your work

1 A game download costs $2 per started GB, up to 3 GB. The dots show the prices for whole numbers of GB. Complete the step graph for $0 < x \leq 3$, marking each open endpoint.



ANSWER _____

2 A V-shaped skate ramp has height $y = |x - 4| + 1$ feet for $1 \leq x \leq 7$ feet. Complete its cross-section graph using the plotted points.



ANSWER _____

CHALLENGE One step up

A piecewise graph has $y = -x + 2$ for $-2 \leq x < 1$ and $y = |x - 3|$ for $1 \leq x \leq 5$. Give the open and filled points at $x = 1$ and the vertex of the absolute value part. Does the graph connect at $x = 1$? Explain.

WORK SPACE AND ANSWER

ANSWER KEY

Graph the Changes

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	For $y = \|x + 1\| - 2$, give the vertex and one point where $x = 0$.	**Vertex: (-1, -2). Point: (0, -1).**
2	For $y = -\|x - 2\| + 4$, give the vertex and one point where $x = 4$.	**Vertex: (2, 4). Point: (4, 2).**
3	A step graph has $y = 1$ for $-2 \le x < 1$ and $y = 3$ for $1 \le x \le 4$. Give its open and filled points at $x = 1$.	**Open: (1, 1). Filled: (1, 3).**
4	A piecewise graph has $y = x + 2$ for $x < 0$ and $y = -x + 1$ for $x \ge 0$. Give its open and filled points at $x = 0$.	**Open: (0, 2). Filled: (0, 1).**

PART 2 · APPLY IT

1. **Draw horizontal steps at $y = 2$ for $0 < x \le 1$, $y = 4$ for $1 < x \le 2$, and $y = 6$ for $2 < x \le 3$. Mark (0, 2), (1, 4), and (2, 6) open; the plotted right endpoints are filled.** Each started GB adds $2. The price stays constant within each interval and rises at the next whole number of GB.
2. **Draw straight segments from (1, 4) through (4, 1) to (7, 4), passing through the plotted points.** The height is 3 feet above the lowest point at both ends of the domain. Connect the points with straight segments to form the V.

CHALLENGE

Open: (1, 1). Filled: (1, 2). Vertex: (3, 0). The graph does not connect at $x = 1$ because the two pieces have different y-values there.

For sketches, accept accurately placed straight segments and horizontal steps. The download graph must show open left endpoints and filled right endpoints.